Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Canceled)

2. (New) A flowmeter comprising:

a vibratable conduit;

a driver connected to the conduit and operable to impart a motion to the conduit;

a sensor connected to the conduit and operable to sense the motion of the conduit; and

a control and measurement system connected to the driver and the sensor, the control and measurement system comprising circuitry to maintain an amplitude of an oscillation of the conduit during a flow of liquid and gas through the conduit when a drive gain applied to the conduit is more than ten times greater than a nominal drive gain, where the nominal drive gain is measured during a non-aerated fluid flow through the conduit at approximately half of a maximum flowrate of the flowmeter.

3. (New) The flowmeter of claim 2 wherein the control and measurement system comprises circuitry to maintain the amplitude of the oscillation of the conduit during the flow of liquid and gas through the conduit when the drive gain applied to the conduit is more than twenty times greater than the nominal drive gain.

4. (New) The flowmeter of claim 2 wherein the control and measurement system comprises circuitry to maintain the amplitude of the oscillation of the conduit during the flow of liquid and gas through the conduit when the drive gain applied to the conduit is more than fifty times greater than the nominal drive gain.

5. (New) The flowmeter of claim 2 wherein the control and measurement system comprises circuitry to increase the drive gain relative to the nominal drive gain in response to inclusion of the gas within the liquid and gas flow.

6. (New) The flowmeter of claim 5 wherein a volumetric fraction of the liquid and gas flow comprising gas is 5% or more.

7. (New) The flowmeter of claim 2 wherein the control and measurement system comprises circuitry to increase the drive gain relative to the nominal drive gain in response to an apparent drop in a density of the liquid and gas flow, the apparent drop in density corresponding to an increase of a proportion of the gas within the liquid and gas flow.

8. (New) The flowmeter of claim 2 wherein a drive current output by the driver is in the range of 0-100 mA.

9. (New) The flowmeter of claim 2 wherein the drive gain is defined as a ratio of a driver current output by the driver to the amplitude of oscillation of the conduit.

10. (New) The flowmeter of claim 2 wherein the drive gain is defined as a ratio of a driver current output by the driver to a sensor voltage detected by the sensor.

11. (New) A controller for a flowmeter comprising:

an input module operable to receive a sensor signal from a sensor connected to a vibratable flowtube, the sensor signal related to a fluid flow through the flowtube;

a signal processing system operable to receive the sensor signal, determine sensor signal characteristics, and output drive signal characteristics for a drive signal applied to the flowtube;

an output module operable to output the drive signal to the flowtube; and

a control system operable to modify the drive signal and thereby maintain oscillation of the flowtube when an apparent density of the fluid flow, as determined by the signal processing

system based on the sensor signal characteristics, drops by more than ten percent in response to an introduction of gas within the fluid flow.

12. (New) The controller of claim 11 wherein the control system is operable to maintain oscillation of the flowtube when the apparent density drops by more than fifteen percent in response to the introduction of gas within the fluid flow.

13. (New) The controller of claim 11 wherein the control system is operable to maintain oscillation of the flowtube when the apparent density drops by more than twenty percent in response to the introduction of gas within the fluid flow.

14. (New) The controller of claim 11 wherein the control system is operable to modify the drive signal by increasing a drive gain applied to the drive signal in response to a reduction of the apparent density.

15. (New) The controller of claim 14 wherein the control system is operable to increase the drive gain by a factor of more than ten times a nominal drive gain, where the nominal drive gain is measured during a flow of water through the flowtube at approximately half of a maximum flowrate of the flowmeter.

16. (New) The controller of claim 14 wherein the drive gain is defined as a ratio of a driver current of the drive signal to an amplitude of oscillation of the flowtube.

17. (New) The controller of claim 14 wherein the drive gain is defined as a ratio of a driver current of the drive signal to a sensor voltage of the sensor signal.

18. (New) A method for operating a flowmeter comprising:

receiving a sensor signal from a sensor connected to a vibratable flowtube, the sensor signal related to a fluid flow through the flowtube;

processing the sensor signal to determine sensor signal characteristics,

determining, based on the sensor signal characteristics, drive signal characteristics for a drive signal applied to the flowtube, the drive signal characteristics including a drive gain;

determining, based on the sensor signal characteristics, a flow transition characterized by the drive gain rising in conjunction with a reduction in an apparent density of the fluid flow; and

transitioning the flowmeter from a first state in which a substantially non-aerated fluid flow exists in the flowtube to a second state in which an aerated fluid flow exists in the flowtube, based on the flow transition.

19. (New) The method of claim 18 wherein determining drive signal characteristics comprises determining a first-state drive gain associated with the first state.

20. (New) The method of claim 19 comprising maintaining oscillation of the flowtube when a second-state drive gain used for driving the flowtube in the second state is more than ten times the first-state drive gain.

21. (New) The method of claim 20 wherein the second-state drive gain is more than twenty times the first-state drive gain.

22. (New) The method of claim 18 wherein determining the flow transition comprises determining the reduction in apparent density to be greater than one percent.

23. (New) The controller of claim 16 wherein the drive gain is defined as a ratio of a drive current of the drive signal to an amplitude of oscillation of the flowtube.

24. (New) The controller of claim 16 wherein the drive gain is defined as a ratio of a drive current of the drive signal to a sensor voltage of the sensor signal.

25. (New) A flowmeter comprising:

a vibratable conduit conducting a fluid flow;

a driver connected to the conduit and operable to impart a motion to the conduit;

a sensor connected to the conduit and operable to sense the motion of the conduit; and

a control and measurement system connected to the driver and the sensor, the control and measurement system comprising circuitry to:

receive a first sensor signal from the sensor during a non-aerated fluid flow through the conduit at approximately half of a maximum flowrate of the flowmeter.

generate, based on the first sensor signal and using digital signal processing, a first drive signal having a drive frequency, the first drive signal having a drive gain based on the first sensor signal;

receive a second sensor signal from the sensor upon introduction of gas to the fluid flow, the gas comprising less than five percent by volume of a total fluid flow;

generate a second drive signal based on the second sensor signal and using digital signal processing; and

update the drive gain in response to the introduction of the gas at a drive gain update rate,

wherein the drive gain update rate is at least five percent of the drive frequency.

26. (New) The flowmeter of claim 25 wherein the control and measurement system is operable to update the drive gain incrementally, each increment occurring at the drive gain update rate.

27. (New) The flowmeter of claim 25 wherein the drive gain update rate is at least ten percent of the drive frequency.

28. (New) The flowmeter of claim 25 wherein the drive gain update rate is at least twenty percent of the drive frequency.

29. (New) The flowmeter of claim 25 wherein the drive gain update rate is at least fifty percent of the drive frequency.

30. (New) The flowmeter of claim 25 wherein the drive gain update rate is at least equal to the drive frequency.

31. (New) The flowmeter of claim 25 further comprising:

an analog-to-digital converter operable to convert the sensor signal received from the sensor from analog form to digital form; and

a digital-to-analog converter operable to convert the drive signal from digital form to analog form, for application to the conduit via the driver.

32. (New) A controller for a flowmeter comprising:

an input module operable to receive a sensor signal from a sensor connected to a vibratable flowtube, the sensor signal related to a fluid flow through the flowtube;

a signal processing system operable to receive the sensor signal, determine sensor signal characteristics using digital signal processing, and output drive signal characteristics for a drive signal applied to the flowtube, the drive signal characteristics including a drive gain to be applied to the drive signal;

a control system operable to modify the drive signal and thereby maintain oscillation of the flowtube at a determined oscillation frequency, wherein the drive gain is modified in response to a change in condition of the fluid flow, as necessary to maintain the oscillation of the flowtube, such that the drive gain incrementally changes at least once per forty cycles of the oscillation frequency; and

an output module operable to output the drive signal to the flowtube.

33. (New) The controller of claim 32 wherein the oscillation frequency corresponds to a natural frequency of vibration of the flowtube.

34. (New) The controller of claim 32 wherein the drive gain is modified in response to a change in condition of the fluid flow, as necessary to maintain the oscillation of the flowtube, such that the drive gain incrementally changes at least once per twenty cycles of the oscillation frequency.

35. (New) The controller of claim 32 wherein the drive gain is modified in response to a change in condition of the fluid flow, as necessary to maintain the oscillation of the flowtube, such that the drive gain incrementally changes at least once per ten cycles of the oscillation frequency.

36. (New) The controller of claim 32 wherein the drive gain is modified in response to a change in condition of the fluid flow, as necessary to maintain the oscillation of the flowtube, such that the drive gain incrementally changes at least once per five cycles of the oscillation frequency.

37. (New) The controller of claim 32 wherein the drive gain is modified in response to a change in condition of the fluid flow, as necessary to maintain the oscillation of the flowtube, such that the drive gain incrementally changes at least once per cycle of the oscillation frequency.

38. (New) A flowmeter comprising:

a vibratable conduit;

a driver connected to the conduit and operable to impart a motion to the conduit;

a sensor connected to the conduit and operable to sense the motion of the conduit; and

a control and measurement system connected to the driver and the sensor, the control and measurement system comprising circuitry to:

receive a first sensor signal from the sensor at a first mass flow rate of fluid through the conduit;

generate, based on the first sensor signal, a measurement output characterizing a property of the fluid;

receive a second sensor signal from the sensor upon a change of the first mass flow rate to a second mass flow rate; and

update, based on the second sensor signal, the measurement output at an update rate that is at least five percent of an oscillation frequency of the conduit.

39. (New) The flowmeter of claim 38 wherein the measurement output includes a pulse output of the flowmeter.

40. (New) The flowmeter of claim 38 wherein the measurement output includes a 4-20mA output of the flowmeter.

41. (New) The flowmeter of claim 38 wherein the property of the fluid includes a mass flow rate of the fluid.

42. (New) The flowmeter of claim 38 wherein the property of the fluid includes a density of the fluid.

43. (New) The flowmeter of claim 38 wherein the update rate is at least ten percent of the oscillation frequency of the conduit.

44. (New) The flowmeter of claim 38 wherein the update rate is at least twenty percent of the oscillation frequency of the conduit.

45. (New) The flowmeter of claim 38 wherein the update rate is at least fifty percent of the oscillation frequency of the conduit.

46. (New) The flowmeter of claim 38 wherein the update rate is greater than or equal to the oscillation frequency of the conduit.

47. (New) A controller for a flowmeter comprising:

an input module operable to receive a sensor signal from a sensor connected to a flowtube oscillating at an oscillation frequency, the sensor signal related to a flow of a fluid through the flowtube;

a signal processing system operable to receive the sensor signal, determine sensor signal characteristics using digital signal processing, and output a measurement output characterizing a property of the fluid flow; and

a control system operable to modify the measurement output in response to a change in condition of the fluid flow, to thereby obtain a modified measurement output, wherein a response time between the change in condition of the fluid flow and an outputting of the modified measurement output is less than 100 ms.

48. (New) The controller of claim 47 wherein the update rate is less than 50 ms.

49. (New) The controller of claim 47 wherein the update rate is less than 30 ms.

50. (New) The flowmeter of claim 47 wherein the measurement output includes a pulse output of the flowmeter.

51. (New) The flowmeter of claim 47 wherein the measurement output includes a 4-20mA output of the flowmeter.

52. (New) The flowmeter of claim 47 wherein the property of the fluid includes a mass flow rate of the fluid.

53. (New) The flowmeter of claim 47 wherein the property of the fluid includes a density of the fluid.